NASA Requirements and Standards, An Update

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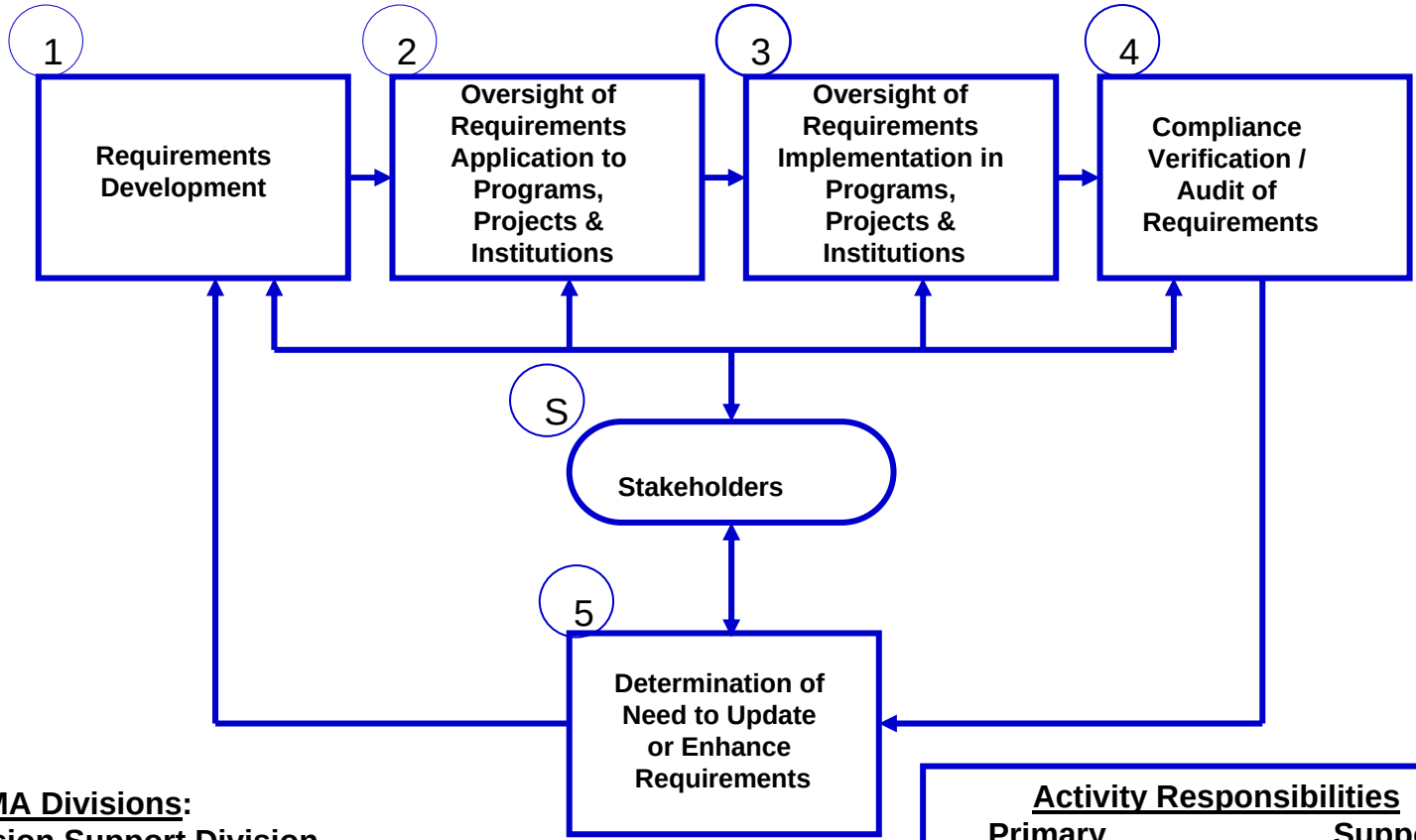
Dr. Michael Stamatelatos, Director
Safety and Assurance Requirements Division
Office of Safety and Mission Assurance
NASA Headquarters

Requirements Philosophy and Objectives

- **It is NASA policy to identify and promulgate NASA internal requirements where necessary to fulfill the Agency's vision, mission, and external mandates.**
- **Written requirements establish the baseline for:**
  - **Performing activities**
  - **Measuring compliance and effectiveness of that performance**
- **Written requirements also:**
  - **Capture and disseminate corporate knowledge**
  - **Codify lessons learned**

NASA SMA Requirements Cycle



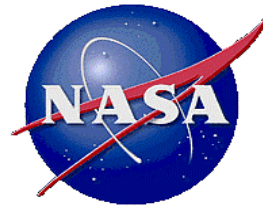
OSMA Divisions:
Mission Support Division
Safety & Assurance Requirements Division
Review and Assessment Division/NASA Safety Center (NSC)

Stakeholders Include:
Programs, Projects, OSMA, Centers, Center SMA Offices, Technical Authority, Office of the Chief Engineer

Activity Responsibilities

	Primary	Support
1)	SARD	MSD, RAD/NSC, S
2)	MSD	SARD, RAD/NSC, S
3)	MSD	RAD/NSC, S
4)	RAD/NSC	MSD, SARD, S
5)	SARD	MSD, RAD/NSC, S

NASA Policy Directives (NPD) and NASA Procedural Requirements (NPR)



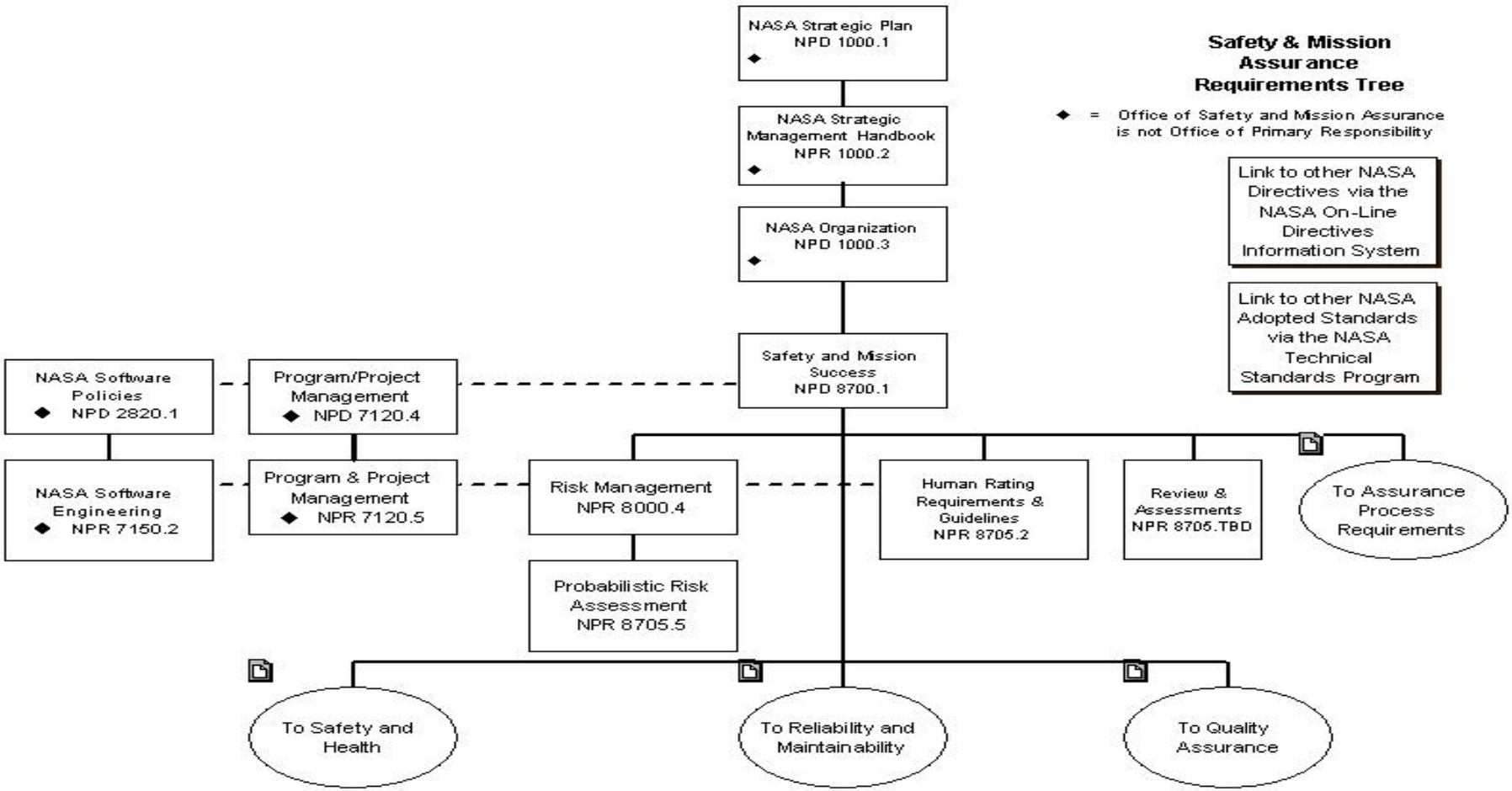
- Guide the business and mission processes of the Agency
- Implement higher level requirements such as Public Laws and Executive Orders
- Document internal policies, procedures, and requirements that establish the parameters for all of the work performed by NASA
- Scope of OSMA Directives includes:
  - Safety (Operational Safety and Systems Safety)
  - Risk Management (including Probabilistic Risk Assessment)
  - Reliability and Maintainability
  - Quality Assurance (including workmanship)
  - Software Safety and Software Assurance
  - Human Rating

Transition from NPG to NPR

- The transition from NPG (NASA Procedures and Guidelines) to NPR (NASA Procedural Requirements) was initiated a couple of years ago because of the need to
  - Eliminate confusion between “guidance” and “requirements”
  - Strengthen requirements
- NASA Procedural Requirements have requirements stated clearly:
  - Written in bold letters
  - With the word “Requirement” stated in parenthesis at the end of each requirement
  - Using “shall” instead of “will” or “should” in the text of the requirement
  - Explanatory statements are kept at a minimum and are written indented in small italic font

The S&MA Document Tree

- http://www.hq.nasa.gov/office/codeq/doctree/qdoc.htm



Types and Uses of S&MA Documents

(Numbering Conventions)

S&MA

- 8700.X = NASA Policy Directive (NPD)
- 8705.X = NASA Procedural Requirements (NPR)
- 8709.X = NASA-Standard (NASA-STD)

Safety*

- 8710.X = NPD
- 8715.X = NPR
- 8719.X = NASA-STD

RAM

- 8720.X = NPD
- 8725.X = NPR
- 8729.X = NASA-STD

Quality

- 8730.X = NPD
- 8735.X = NPR
- 8739.X = NASA-STD

*The safety category also includes 8621 series (Mishap Reporting) directives
Software requirements can also be found in the 2800 series.

New and Updated NPRs within the Last Two Years

Number	Name	Date
NPR 8621.1B	NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping	23 May 2006
NPR 8705.2A	Human Rating Requirements for Space Systems	7 February 2007
NPR 8705.6	Safety and Mission Assurance Audits, Reviews, and Assessments	4 October 2005
NPR 8715.1	NASA Occupational Safety and Health Programs	15 March 2006 (Revalidation)

New and Updated NPRs within the Last Two Years (continued)

Number	Name	Date
NPR 8715.3A	NASA General Safety Program Requirements	12 September 2006
NPR 8715.5	Range Safety Program	8 July 2005
NASA-STD-8719.10	Standard for Underwater Facility and Non-open Water Operations	16 November 2006
NASA-STD-8719.11	Safety Standard for Fire Protection	6 April 2006 (Revalidation)
NASA-STD-8719.17	NASA Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PV/S)	22 September 2006

New and Updated NPRs within the Last Two Years (continued)

Number	Name	Date
NPD 8730.5	NASA Quality Assurance Program Policy	27 October 2005
NPR 8735.2A	Management of Government Quality Assurance Functions for NASA Contracts	2 August 2006

NASA Technical Standards

- Establish a consistent technical environment across NASA
- Establish a common technical base at the agency level that can be adapted to program/project needs through application specific tailoring
- Establish a mandatory baseline in all significant technical areas; minimize Center discipline-focused standards
- NASA must make maximum use of accepted, existing practices (industry, other Government, international)
  - Unique practices without a well defined technical basis raise costs
  - OMB Circular A-119 requires preference for “Voluntary Consensus Standards” (VCS) over Government standards
- NASA Technical Standards process must ensure that we:
  - Fully justify the need for separate NASA Standards
  - Have complete Center and Program buy-in for the standards we create

NASA Technical Standards

- 69 NASA Standards/Handbooks/Specs published since 1996
  - OSMA: 19, OCE: 31, CIO: 20
- 37 additional OCE documents now in development
  - 14 publications planned for FY2007
- OCHMO document submitted
- NASA-led or supported Voluntary Consensus Standards (VCS)
  - In FY2005, 144 people supported 198 VCS activities
  - During the past 5.5 years, the Top 20 standards sources represent 90% of NASA downloads; NASA Standards are 5th largest source
- Participating in DoD Space Industrial Base Council/Standards Working Group to increase commonality of standards requirements across all Government space programs
- Supporting Constellation use of program independent standards (VCS, MIL and NASA) to provide benchmark of evolving practice for future re-assessment of "fixed" program requirements
  - Created 7 "Interim NASA Technical Standards" from ongoing projects to meet Constellation SRR needs

NASA Technical Standards Development Process

1. Identify need for NASA Standard
   - Solicit proposals and evaluate
2. Develop Standard through Agency Subject Matter Experts
   - Open to all Centers
3. NASA-wide review by Center: OSMA/SMA, Engineering, and Program Offices
   - Coordinated through Center S&MA Directors with copy to the Technical Standards Working Group
4. Disposition Comments
   - Concurrence on resolution required
5. Concurrence for Centers
   - May require second round of comment resolution
6. Approval and Publication
   - Sponsoring Office (OSMA, OCE, CIO) approves, published on common web site accessible to all

How to Access Directives and Standards

- **Directives**
  - NASA On-line Directives Information System (NODIS) at http://nodis3.gsfc.nasa.gov/
  - Most signed documents are available to anyone with web access
  - Documents within the development process are available only within NASA (http://nodis-dms.gsfc.nasa.gov/dms/dms.cfm)
  - NODIS is the source for OSMA Document Tree Directive links
- **Standards**
  - All NASA S&MA documents are currently available to anyone with web access via the OSMA website
  - OSMA website is the source for NASA S&MA Standards
  - NASA adopted Standards are available through commercial sources

Recommended* Terminology for the Management of Requirements

- Non-conformance – **the state or situation of not fulfilling a requirement**
- Exception - **A written authorization granting permanent relief from a specific, non-applicable requirement.**
- Waiver - **A written authorization allowing relief from a requirement. (Note: The relief can be temporary)**
- Tailoring - **The process by which exceptions to requirements are identified, justified, and authorized.**

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* **Recent "Definitions" team with members from from OSMA, OCE and Constellation**

Terms no Longer Recommended

- Deviation - **The concepts previously covered by the term deviation are now encompassed by the terms exception and waiver. This term is no longer recommended for new programs/projects.**

- Variance – **This term has specific significance in the administration of OSHA requirements and will only be used in relation to OSHA regulations and requirements.**

Old terminology will be retained for on-going programs/projects;
The new terminology will be used in new programs/projects